Abstract

Title: Onsite generation of electricity from discharged urine from male toilets in non-residential buildings

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Keywords: Non-residential buildings, urine diversion, electrolysis, electricity generation

I. Abstract Body (up to 250 words)

This research study explores the potential for producing electricity from discharged urine in the daily operation of male toilets in non-residential buildings. The majority of the population in metropolitan cities lives in these high-rise buildings apart from residential buildings. High-rise buildings consume large amounts of energy in daily operation and release considerable amounts of waste including human urine into the environment. In addition, untreated urine from urinal of these buildings contains polluting organic compounds and requires energy-consuming treatment prior to discharge into waterways. Urea is a major composition of urine. Urea contains four hydrogen atoms which are less tightly bonded than H2O in water. Hydrogen, which is a clean source of energy, is considered by scientists as a promising fuel for future. Hydrogen and urea (Fig. 1). Operation of hydrogen fuel cell are produced in electrolysis of urine. The generated hydrogen gas can be utilized to generate electricity for building operations. Ohio University in the USA has developed Ammonia Green Box® which can extract hydrogen gas directly from urine by electrochemical oxidation using an economical catalyst. Electricity is produced from the electrolysis of hydrogen gas in a hydrogen fuel cell. The simple and convenient hydrogen extraction process is suitable to be applied high-rise developments. Production of electricity from urine can reduce power supply from the grid system and subsequently reduce building management cost.

II. Image:

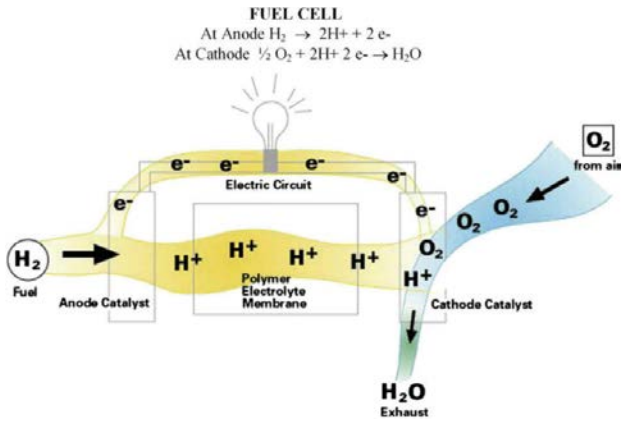


Figure 1: Operation of hydrogen fuel cell

III. Reference:

1 Huo, X., Yu, A. T. W., & Wu, Z. (2018). An empirical study of the variables affecting site planning and design in green buildings. Journal of Cleaner Production, 175, 314-323.

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3. Wu, Z., Shen, L., Yu, A.T.W. and Zhang, X. (2016) A comparative analysis of waste management requirements between five green building rating systems for new residential buildings, Journal of Cleaner Production, 112(1), 895-902.

IV. Biography:

Ann T.W. Yu is an Associate Professor in the Department of Building and Real Estate of The Hong Kong Polytechnic University. She has 15+ years of experience in the field of construction and demolition waste. Dr. Yu teaches in both undergraduate and postgraduate levels, conducting research projects and carrying out consultancy services. Her research interest includes C&D waste management, construction project management, value management, building procurement systems and sustainable construction. She has a strong track record and has published extensively on the broad theme of project management in leading construction management journals and international internal conference proceedings.

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